



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

NOTE ON DISTOMUM ARCANUM (N. SP.) IN AMERICAN FROGS.

W. S. NICKERSON.

IN frogs used for laboratory dissection I have observed, in many cases, cysts forming considerable swellings just at the pylorus. These, when opened, are found to contain small distomes, together with a mass of friable material, which under the microscope is seen to consist in part of eggs and in part of a finely granular stainable substance whose source I have not determined. The worms, though closely resembling several species which inhabit the intestines of European frogs, seem nevertheless to be distinct from them morphologically, and have, I believe, not been mentioned heretofore. I shall describe them under the name *Distomum arcanum*, the specific name referring to their being concealed from view in the cyst. So far as observed, the cysts occur always, when present, just at the pylorus, where they form conspicuous rounded swellings, about three millimeters in diameter. In extreme cases of infection as many as four or five of these may be present in the same frog. Two worms are usually present in a cyst. The wall of the cyst is composed of fibrous tissue and smooth muscle, which completely surround and enclose the contents. Several series of sections of cysts and contents have failed to show any indication of a connection between the cavity of the cyst and the lumen of the intestine. The accumulation of so large a mass of eggs and other material within the cyst tends further to disprove the existence of an opening from the cyst. The sexually mature worms have been completely imprisoned by their host.

The preserved specimens are small, stout, ovoidal, or spheroidal worms, the largest measuring $2\frac{1}{2} \times 1\frac{3}{4}$ mm., and the average size being about $1\frac{1}{2} \times 1\frac{1}{4}$ mm. The rather small suckers are of nearly equal size, the oral being slightly larger than the ventral. The latter, which is rather feebly developed,

is about two-thirds the length of the animal from the anterior end. The surface of the body is thickly set with minute scales or spines, which diminish in size toward the posterior extremity. The sexual orifice is near the left side, ventral, rather nearer to the oral than to the ventral sucker. The excretory pore is

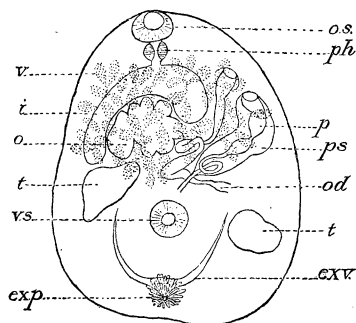


FIG. 1.—Outline drawing of *D. arcanum*, showing positions of chief organs as seen from ventral side. Uterus (except terminal portion) not represented. Camera outline $\times 38$. *exp*, excretory pore; *exv*, excretory vesicle; *i*, intestine; *o*, ovary; *od*, oviduct (terminal portion); *o.s.*, oral sucker; *p*, penis; *ph*, pharynx; *ps*, penis sac; *t*, testis; *v*, vitellary glands; *vs*, ventral sucker.

dorsal, nearly terminal, median, surrounded by a small cluster of gland cells.

The pharynx is small and placed immediately behind the oral sucker, and is followed at once by the bifurcation of the intestine. The limbs of the intestine are short and sac-like, extending backward, not farther than the middle of the body. The walls are thin and feebly developed.

The ovary is irregular in form or lobulated, and is situated just behind the forking of the intestine, a little to the right of

the median line. Vitellary glands lying nearer the ventral surface are irregularly distributed through a zone extending from about opposite the pharynx back nearly to the ventral sucker. They appear as small cell-clusters or masses having a loosely dendritic arrangement.

The region of the union of the oviduct with the ducts from the vitellary glands and of the giving off of Laurer's canal is in the central portion of the body, just back of the ovary and nearer the dorsal surface, but the exact arrangement of these tubules I have not made out. The shell gland is readily seen in sections but not usually evident in entire preparations. Laurer's canal opens on the dorsal surface posterior to the ovary, nearly over the ventral sucker. The oviduct or uterus fills the greater portion of the space remaining between and around the other internal organs, but its folds appear to lack any definiteness of arrangement.

There are two testes, somewhat elongated or of slightly irregular outlines, situated one upon either side of the body, about in line transversely with the ventral sucker. The penis sac is a prominent organ at the left of the ovary and having a length of about one-fourth the length of the worm. It has thick muscular walls within which the retracted penis lies coiled.

The vagina, or terminal portion of the oviduct, opens immediately beside the opening from the penis sac and in front of it. The two openings appear in many specimens as separate apertures upon the surface of the body; in others they open into a common groove or depression of the body wall or genital atrium.

The eggs are elliptical or very slightly ovoidal in outline, measuring about $23 \times 13 \mu$. The line of separation of the lid is usually not evident.

The excretory vesicle forks just in front of the excretory pore, forming two tubules which diverge as they extend forward near the testes, beyond which I have not traced them.

It will be seen from the foregoing description that *D. arcanum* is closely related to several species which it resembles in its small size, compact form, spiny covering, rudimentary intestine, and laterally placed sexual aperture, as well as in being parasitic in the intestine of the frog. *D. medians* is the form which it resembles most closely, the two species being essentially alike in many respects. *D. medians* has, however, a regular rounded ovary, situated on the right side, while, as already stated, the ovary in *D. arcanum* is lobulated and nearly median in position. The latter species appears also to be a little smaller and less elongated. The vitellaria, also, are distributed over a zone whose breadth is about one-half the length of the worm, while *D. medians* has the vitellaria restricted to the anterior quarter of the animal. Measurements of the eggs of the two species show that they also differ in size. There is further to be taken into account the fact that *D. medians* lives free in the intestine in (European) frogs, while *D. arcanum* is found completely enclosed within cysts at the pylorus of

SMALL DISTOMES WITH Laterally Placed Gonophore (Left) and Spiny Covering.¹

	OVARY.	TESTES.	INTESTINE.	SUCKERS.	SIZE, MM.	OVA, μ .	OCCURRENCE.
<i>D. clavigerum</i> Rud.	rounded, on right side, near ventral sucker	in hinder part of body	forks long	oral larger, 3:2 (2:1)	- 3.3 long	33 \times 16	intestine of frogs, etc. (European)
<i>D. medians</i> Olsson	round or oval, on right side, opposite fork of intestine	laterally placed in line with ventral sucker	forks reach middle of body	oral larger, 14:11	2 \times 1	30 \times 16	intestine of frogs and toads from pylorus to midway of intestine (European)
<i>D. confusum</i> Looss	rounded, median, in front of ventral sucker	near anterior end, in line with pharynx, one on each side	forks short	oral little larger, 16:15	1.36 \times 1	34 \times 13	intestine of frog, etc., at pylorus, not back of opening of gall duct (European)
<i>D. arcanum</i> n. sp.	lobulated, nearly median, just back of fork of intestine	laterally placed in line with ventral sucker	forks short, not reaching beyond middle of body	oral little larger	1.5 \times 1.25 (largest 2 \times 1 $\frac{1}{2}$)	23 \times 13	in cysts at pylorus of frogs (American)

¹ The descriptions of the three European species are as given by Looss (1894), *Die Distomen unserer Fische und Frösche*.

(American) frogs. In view of these differences there can, I think, be no question that the two forms are distinct species.

From *D. clavigerum* it differs in being smaller and less elongated and in having short limbs to the intestine, while in that form the limbs of the intestine reach nearly to the posterior end of the body.

It is readily distinguished from *D. confusum* by the fact that the latter form has the testes far forward, alongside of the pharynx. The resemblances and differences of these four forms may be best shown perhaps by the tabular statement on the opposite page of their chief characteristics.

I have collected about fifty specimens of *D. arcanum*, all from frogs dissected in Massachusetts. I have not found them in western frogs. No record was kept of the species of frogs from which specimens were taken, and I have, therefore, no means of judging whether it occurs in all the different species or only in particular ones. The specimens collected were taken from frogs used for laboratory dissection, the greater number being the larger common species, except the bullfrog (*R. catesbiana*).

I had hoped to supplement these observations, made mostly several years ago and in large part upon preserved specimens, by the study of other living worms; but, as such specimens are not to be obtained in Minnesota, it seems best to publish such notes as I have without further waiting.

UNIVERSITY OF MINNESOTA,

July 17, 1900.